

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A semiconductor device comprising:

a channel of a first conductivity type formed on a surface layer of a semiconductor substrate;

a source and a drain of a second conductivity type formed on both sides of the channel;

a gate insulation film with a first relative permittivity formed at least on said channel directly or through a buffer insulation film;

a gate electrode formed on said gate insulation film; and

a side insulation film formed at least on a side of said gate insulation film and having a second relative permittivity which is smaller than the first relative permittivity, wherein

when a first length, which is a length of the gate insulation film adjacent to said surface layer on the gate electrode side along a channel length direction, is L1, a second length, which is a length of the gate insulation film adjacent to said surface layer on said channel side along the channel length direction, is L2, and a third length, which is a length of a bottom part of said gate electrode parallel to the channel length direction, is L3,

the length L1 is longer than the length L2, and the length L3 is longer than the length L1.

Claim 2 (Original): The semiconductor device according to claim 1, wherein the first permittivity is 20 or more.

Claim 3 (Currently Amended): The semiconductor device according to claim 1, wherein the ~~area S2~~ length L2 is 1.5 times or more as large as the ~~area S1~~ length L1.

Claim 4 (Original): The semiconductor device according to claim 1, wherein, a width of said gate insulation film on the channel side is smaller than a width of said gate insulating film on the gate electrode side in a length along a channel width direction of said gate insulation film.

Claim 5 (Original): The semiconductor device according to claim 1, wherein a sectional shape along a direction of the source-drain of said gate insulation film is one of tapered shape, a trapezoid, a sector, and a stair.

Claim 6 (Currently Amended): The semiconductor device according to ~~Claim~~ claim 1, wherein a sectional shape of said gate insulation film along a direction from the gate electrode to said channel is one of a tapered shape, a trapezoid, a sector, and a stair.

Claim 7 (Original): The semiconductor device according to claim 1, wherein said first gate insulation film is a high dielectric film or a ferroelectric film including a composition or an element of one of Ta_2O_5 , $\text{Sr}_2\text{Ta}_2\text{O}_7$, TiO_2 , SrTiO_3 , BaTiO_3 , CaTiO_3 , $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$, PbTiO_3 , $\text{PbZr}_x\text{Ti}_{1-x}\text{O}_3$, $\text{SrBi}_2\text{Ta}_2\text{O}_9$, $\text{SrBi}_2(\text{Ta}_x\text{Nb}_{1-x})_2\text{O}_9$, or $\text{Bi}_2(\text{Ta}_x\text{Nb}_{1-x})\text{O}_6$.

Claim 8 (Original): The semiconductor device according to claim 1, wherein said buffer insulation film includes one of SiO_2 , Si_3N_4 , NO , TiO_2 , SrTiO_3 , MgO or CeO_2 .

Claim 9 (Currently Amended): A semiconductor device comprising:
a channel of a first conductivity type formed on a surface layer of a semiconductor substrate;

a source and a drain of a second conductivity type formed on both sides of the channel;

a gate insulation film with a first relative permittivity formed at least on said channel directly or through a buffer insulation film;

a gate electrode formed on said gate insulation film; and

a side insulation film formed at least on a side of said gate insulation film and having a second relative permittivity which is smaller than the first relative permittivity,

wherein

an electric flux density in said gate insulation film on a side towards the channel side is more dense than an electric flux density in said gate insulation film on a side towards the gate electrode,

an area of a bottom part of said gate electrode is larger than an area of an upper part of said gate insulation film, and

a length of a bottom part of said gate electrode parallel to ~~along~~ a channel length direction is longer than a length of an upper part of said gate insulation film along a channel length direction.

Claim 10 (Currently Amended): A semiconductor device comprising:

a plurality of first MOS transistors, each of said first MOS transistors including a first channel of a first conductivity type formed on a surface layer of a semiconductor substrate, a first source and a first drain of a second conductivity type formed to both sides of said first channel, a first gate insulation film with a first relative permittivity formed at least on the first channel directly or through a buffer insulation film, a first gate electrode formed on said first gate insulation film, and a first side insulation film formed at least on a side of said first gate

insulation film and having a second relative permittivity which is smaller than the first relative permittivity; and

a plurality of second MOS transistors, each of said second MOS transistors including a second channel of the first conductivity type formed on a surface layer of said substrate, a second source and a second drain of the second conductivity type formed on both sides of said second channel, a second gate insulation film with the first relative permittivity formed at least on said second channel directly or through a buffer insulation film, a second gate electrode formed on said second gate insulation film, and a second side insulation film formed at least on a side of said second gate insulation film and having said second relative permittivity, wherein

when a cross-section on a side of said first channel is S1, a cross-section on a side of said first gate electrode is S2, a cross-section on a side of said second channel is S3, and a cross-section on a side of said second gate insulation film is S4, a condition of:

$$S2/S1 > S4/S3$$

is satisfied,

an area of a bottom part of said gate electrode parallel to the channel length direction is larger than an area of an upper part of said gate insulation film, and

a length of a bottom part of said gate electrode along a channel length direction is longer than a length of an upper part of said gate insulation film along a channel length direction.

Claim 11 (Original): The semiconductor device according to claim 10, wherein the first permittivity is 20 or more.

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Claim 12 (Currently Amended): The semiconductor device according to claim 10,
wherein a voltage applied to the first gate electrode is lower than a voltage applied to the
second gate electrode.